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EXAMINER
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GROSS, KENNETH A

ART UNIT	PAPER NUMBER
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2122

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DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/630,411

Applicant(s)

FARCHI ET AL.

Examiner

Kenneth A Gross

Art Unit

2122

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claim 14 is objected to because of the following informalities: Specifically, the term “structure for holding for each thread a corresponding index counter” on lines 4-6 should be “structure for holding, for each thread, a corresponding index counter”. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 7-17, 20-27 and 28-35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Although the applicant has overcome the USC 112, 1<sup>st</sup> paragraph rejection of Claims 1-6 (now Claims 1 and 3-6), 18, and 19, the applicant is directed to the USC 112, 1<sup>st</sup> paragraph rejection filed November 4<sup>th</sup>, 2003, which states that Claims 7, 20-24, and 28 contain similar problems as addressed in Claim 1 and now rejected Claim 2. Specifically, the question of how and when a debugger command is placed in trace file still remain in these Claims. For example, in Claim 7, item (iii) states “a debugger command embedded in the trace file in place of the traced value”. When is this debugger command placed in the trace file? There is no indication in Claim 7 and similar Claims when a debugger command is placed in the trace file after the trace file is created in step (ii). Furthermore, Claims

24 and 25 correspond with Claim 1 and now rejected Claim 2, and contain similar problems as addressed in the office action mailed on November 4<sup>th</sup>, 2003. Claims 8-17, 26-27, and 29-35 are rejected for being dependent on a rejected parent Claim.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-6, 9-17, 27, 29, and 30-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, Claim 4 recites, "rerunning the program with identical interleaving as far as instrumentation statements are concerned" (Lines 5-6). The term "instrumentation statements" lacks antecedent basis. Claim 4 or parent Claims do not mention instrumentation statements, where they are inserted, or what it means to rerun the program "as far as instrumentation is concerned". Claim 5 recites "the mechanism" and "the instrumentation statements" on lines 2 and 3, which lacks antecedent basis. Claim 5 is interpreted to depend from Claim 4, not Claim 1. Claim 6 recites the term "the interleaving" on line 5, which lacks antecedent basis. Claim 12 recites "during a respective one of the threads" on lines 8-9. What does it mean for a command to be executed "during a thread"? This limitation is interpreted to mean "during the running of a respective one of the threads". Claim 15 recites the limitation "the wrong time" on line 10. It is no clear from the claim when exactly "the wrong time" is?

Note that corresponding Claims also contain similar errors that need to be addressed. Corresponding claims include Claims 9-11, 27, 29, 30, and 33.

Claims 13, 14, 16, 17, 31, and 32 are rejected for being dependent on a rejected parent Claim.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 18, 19, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Poteat et al. (U.S. Patent Number 5,970,245).

In regard to Claim 1, Poteat teaches: (a) embedding within said single thread at said desired location thereof a utility which reads a trace file in which said at least one predetermined debugger command has been previously embedded (Figure 3, items 26 and 28); (b) running the program so that on reaching said desired location, the utility is invoked for reading said trace file and invoking said at least one predetermined debugger command (Figure 7, items 44, 50, 52, and 54).

Claims 18, 19, and 24 are medium, product, and system Claims that correspond with Claim 1, and are rejected for the same reasons as Claim 1, where Poteat teaches a medium (Figure 1, item 20), product, and system (Figure 1) for carrying out said method of Claim 1.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poteat et al. (U.S. Patent Number 5,970,245) in view of Swoboda (U.S. Patent Number 6,388,533).

In regard to Claim 3, Poteat teaches the method of Claim 1, but does not teach that the debugger attaches itself to the predetermined debugger command, which halts the execution of the program and shows the state of the program at that time. Swoboda, however, does teach halting the execution of a program and showing the state of a program at a breakpoint, which is a debugger command (Column 11, lines 58-62). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 1, as taught by Poteat, where the debugger attaches itself to the predetermined debugger command, which halts the execution of the program and shows the state of the program at that time, since this allows a user to analyze the program at a selected state.

Claim 26 is a system Claim that corresponds with method Claim 3, and is rejected for the same reasons as Claim 3, where Poteat teaches a system (Figure 1) for carrying out said method of Claim 3.

10. Claims 4-6 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poteat et al. (U.S. Patent Number 5,970,245) in view of "Deterministic Replay of Java Multithreaded

Applications” by Jong-Deok Choi et al., 1998 ACM SIGMETRICS Symposium on Parallel and Distributed Tools (SPDT), August 1998, pp. 48-59 (hereinafter Choi).

In regard to Claim 4, Poteat teaches the method of Claim 1, but does not teach providing a mechanism for rerunning the program with identical interleaving as far as the instrumentation is concerned. Choi, however, does teach a method of replaying a multi-threaded program using instrumentation (Page 1, Column 2, lines 8-14 and Page 10, Column 2, lines 3-14). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 1, as taught by Poteat, further providing a mechanism for rerunning the program with identical interleaving as far as the instrumentation is concerned as taught by Choi, since this allows for deterministic replay of a non-deterministic execution instance.

In regard to Claim 5, it would be obvious to automate the process of Claim 4, since automating a process makes the process operate without user intervention.

In regard to Claim 6, Choi teaches that the program includes multiple threads, each of which prints an invariant associated with a status of the program, where the value remains constant regardless of the interleaving threads (Page 2, Column 1, lines 15-32).

Claim 27 is a system Claim that corresponds with method Claim 4, and is rejected for the same reasons as Claim 4, where Poteat teaches a system (Figure 1) for carrying out said method of Claim 4.

11. Claims 7-11, 20-23, 25, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Implicit-Specification Errors and Automatic, Trace-Based Debugging” by Edward G. Okie and James D. Arthur, 1993 (hereinafter Okie) in view of Poteat et al. (U.S. Patent Number 5,970,245).

In regard to Claim 7, Okie teaches: (a) checking whether a trace file exists and if the trace file does not exist on entry to the utility, creating the ttrace file and writing a traced value of at least one variable thereto at a desired location in the program (Page 24-25, Section 3); (b) if the trace file exists, comparing a current value of at least one variable with a respective line in the trace file and if they are different, invoking a debugger (Pages 26-27, Section 5). Okie does not teach that the checking is done through an embedded utility in a thread of a program or that the debugger is activated by a debugger command in the trace file. Poteat, however, does teach embedding the utility (Figure 3, item 26) and a debugger command in the trace (Figure 3, item 28). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of checking whether a trace file exists and if the trace file does not exist, creating the trace file and writing a traced value of at least one variable thereto, and if the trace file exists, comparing a current value of at least one variable with a respective line in the trace file and if they are different, invoking a debugger, as taught by Okie, where the checking is done through an embedded utility in a thread of a program and the debugger is activated by a debugger command in the trace file, as taught by Poteat, since this allows automatic tracing and debugging of variables in a program.

Claims 8-11 contain limitations that have already been addressed in the rejection of Claims 3-6, respectively, and Claim 8-11 are rejected for the same reasons as Claims 3-6, respectively.

Claims 20 and 22 are medium Claims, Claims 21 and 23 are product Claims, and Claims 25 and 28 are system Claims that corresponds with method Claim 7, and is rejected for the same



reasons as Claim 7, where Poteat teaches a medium (Figure 1, item 20), product, and system (Figure 1) for carrying out said method of Claims 20-23, 25, and 28.

12. Claims 12, 13, 15, 17, 30, 31, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Implicit-Specification Errors and Automatic, Trace-Based Debugging” by Edward G. Okie and James D. Arthur, 1993 (hereinafter Okie) in view of Poteat et al. (U.S. Patent Number 5,970,245) and further in view of “Trace Viewer” by International Business Machines Corporation, Research Disclosure Database Number 415083).

In regard to Claim 12, Okie and Poteat teach the method of Claim 7, but do not teach creating for each thread a respective trace file having a name that is uniquely defined by a name of the respective thread. However, the “Trace Viewer” reference does teach storing multiple trace files for each thread of a program including a unique thread ID for each thread (Page 2, lines 12-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 7, as taught by Okie and Poteat, further creating for each thread a respective trace file having a name that is uniquely defined by a name of the respective thread, as taught by the “Trace Viewer” reference, since this allows information for each thread to be easily accessed.

In regard to Claim 13, the examiner takes official notice that naming files according to a naming scheme is well known in the art, since this allows for files to be universally understood across a given organization.

In regard to Claim 15, Okie and Poteat teach the method of Claim 11, but do not teach bipartite matching between threads and traces so that each thread has a trace. The “Trace Viewer” reference, however, does teach storing multiple trace files for each thread of a program

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(Page 2, lines 12-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 11, as taught by Okie and Poteat, further insuring that each thread has a trace, as taught by the "Trace Viewer" reference, since this allows information for each thread to be easily accessed.

In regard to Claim 17, Okie and Poteat teach the method of Claim 11, but do not teach reading local views of the threads only in regard to the trace file. The "Trace Viewer" reference, however, does teach storing multiple trace files for each thread of a program (Page 2, lines 12-15), and hence allowing for local thread traces. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 11, as taught by Okie and Poteat, further reading local views of the threads only in regard to the trace file, since this allows information for each thread to be easily accessed.

Claims 30, 31, 33, and 35 are system Claims that corresponds with method Claims 12, 13, 15, and 17, and are rejected for the same reasons as Claims 12, 13, 15, and 17, respectively, where Poteat teaches a system (Figure 1) for carrying out said method of these Claims.

13. Claims 14 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Implicit-Specification Errors and Automatic, Trace-Based Debugging" by Edward G. Okie and James D. Arthur, 1993 (hereinafter Okie) in view of Poteat et al. (U.S. Patent Number 5,970,245) and further in view of "Trace Viewer" by International Business Machines Corporation, Research Disclosure Database Number 415083) and Bopardikar et al. (U.S. Patent Number 6,052,739).

In regard to Claim 14, Okie, Poteat, and the "Trace Viewer" reference teach the method of Claim 13, but do not teach assigning a root name to a root thread, maintaining an index

structure for holding each thread, and naming children threads with a prefix of the name of a parent thread and a suffix of the index counter of the respective parent thread. Bopardikar, however, does teach a thread array for holding an array of children threads, where the array name is a parent thread (Column 12, lines 56-65). An array is obviously referenced with the name of the array and an index of the array indicating the array element. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 13, as taught by Okie, Poteat, and the "Trace Viewer" reference, further assigning a root name to a root thread, maintaining an index structure for holding each thread, and naming children threads with a prefix of the name of a parent thread and a suffix of the index counter of the respective parent thread, as taught by Bopardikar, since this allows the threads to be stored in an array, which is a common data structure for storing elements.

Claim 32 is a system Claim that corresponds with method Claim 14, and is rejected for the same reasons as Claim 14, where Poteat teaches a system (Figure 1) for carrying out said method of Claim 14.

14. Claims 16, 29, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Implicit-Specification Errors and Automatic, Trace-Based Debugging" by Edward G. Okie and James D. Arthur, 1993 (hereinafter Okie) in view of Poteat et al. (U.S. Patent Number 5,970,245) and further in view of "Deterministic Replay of Java Multithreaded Applications" by Jong-Deok Choi et al., 1998 ACM SIGMETRICS Symposium on Parallel and Distributed Tools (SPDT), August 1998, pp. 48-59 (hereinafter Choi).

In regard to Claim 16, Okie and Poteat teach the method of Claim 11, but do not teach providing a mechanism for creating traces for a subset of threads. Choi, however, does teach

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recreating a running program by tracing a subset of threads (Page 4, Section 2.1). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 11, as taught by Okie and Poteat, further providing a mechanism for creating traces for a subset of threads, as taught by Choi, since this allows tracing and examination of only interesting threads.

Claim 29 is a system Claim that corresponds with method Claim 4, and is rejected for the same reasons as Claim 4, where Poteat teaches a system (Figure 1) for carrying out said method of Claim 4.

Claim 34 is a system Claim that corresponds with method Claim 16, and is rejected for the same reasons as Claim 16, where Poteat teaches a system (Figure 1) for carrying out said method of Claim 16.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth A Gross whose telephone number is (703) 305-0542. The examiner can normally be reached on Mon-Fri 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q Dam can be reached on (703) 305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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KAG



**TUAN DAM**  
**SUPERVISORY PATENT EXAMINER**